U.S.Department
of Transportation
**Federal Aviation
Administration**

Office of the Administrator

800 Independence Ave.,S.W.
Washington, D.C. 20591

June 5, 2001

Dear Members of the Aviation Community:

As you are aware, there is a growing gap between the demand for air transportation and capacity to meet that demand. Air transportation is a shared national resource supported by the investments of a wide range of users and service providers. Each stakeholder (passengers, carriers, pilots, controllers, manufacturers, airport authorities and local residents) has unique objectives, concerns and investments in the National Airspace System (NAS). Multiple views of the capacity-demand imbalance have made it difficult to maintain community focus. Yet, progress depends on a coordinated set of investments and commitments. For this reason, we initiated development of an operationally oriented plan for NAS evolution that integrates and aligns the FAA's activities with those of industry and the users.

The Operational Evolution Plan (OEP) is the FAA's commitment to meet the air transportation needs of the United States for the next ten years with a focus on maintaining safety, increasing capacity, and managing delays. Community agreement on the plan will clarify the responsibilities of individual members of the aviation community and help to establish a climate of accountability throughout the industry. To that end, the FAA has assigned a single point of accountability (with a support team from across all lines of business) for each solution in the plan.

The aviation community at large has been invited to participate in problem identification and solution validation through our web site, one-on-one meetings and various public forums over the last several months. As we move forward, I want to emphasize three points:

- FAA must become more performance based. The commitments, actions and decisions provided in the OEP are our foundation for a comprehensive performance plan for the new air traffic organization.
- Partnership is key—participation and cooperation from all members of the aviation community are essential to turning this plan into action. Success requires accountability.
- Quality decisions begin with an understanding of each other's points of view—the NAS is a complex system with interconnected and interdependent elements and challenges. We must communicate fully and openly.

As a community, we must continue to seek early benefits and encourage innovation in development of additional means for expanding capacity to meet the needs of the flying public. The OEP will mature over time through joint community decisions. The current version represents a credible set of initiatives to increase capacity. Updates will be made as key decisions are reached, risks are mitigated, or discoveries are made for new solutions to the operational problems. The OEP will be our basis for planning future enhancements to the operations. Our existing strategic and performance plans will be revised over time to reflect the commitments and research called for in this plan.

Thank you for your continued and active participation.

Jane F. Garvey

Jane F. Garvey
Administrator

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INTRODUCTION

THE CAPACITY PROBLEM

Since the beginning of commercial air transportation, the National Airspace System (NAS) has evolved to meet the country's needs for safe and efficient air transportation. This evolution has brought us to the point where 1.9 million passengers, 40 thousand tons of cargo, and 60 thousand general aviation and non-scheduled flights move through the system daily, all at unprecedented safety levels. This growth in air travel has brought the system to a point where its flexibility and capacity are fully taxed. And, we anticipate another one million passengers per day by 2010.

Air travelers are experiencing increasing flight delays and cancellations from a growing imbalance between their demand and the ability of the system to handle the air traffic. The mismatch is most pronounced during peak flying periods at major hubs. In addition, congested airspace and complex traffic flows can cause delays to ripple through large portions of the country. The pressure to make most efficient use of the available capacity also limits the flexibility needed to respond when weather reduces airport arrival/departure rates or blocks portions of en route airspace.

There is a growing imbalance between the demand for air travel and capacity.

Traffic is concentrated at key airports

- Two-thirds of the scheduled traffic moves through hub airports
- Approximately 90 percent of the delay is experienced at these airports
- Demand will grow by 200 million passengers at these airports over the coming decade

En-route traffic is similarly concentrated

- Geography plays a key role in defining high-demand areas
- Bottlenecks appear where complex airspace design and traffic flows impede traffic
- Airspace structure is designed to simplify traffic flows but sometimes reduces flexibility

Near-Term Plans (2001):

- ***Resolve choke points***
- ***Spring 2001, Collaboration and Information Sharing***

Mid-Term Plans (2002-2004):

- ***Optimize airspace design***
- ***Widespread use of Free Flight tools***
- ***Reduced vertical separation***
- ***Enhanced navigation procedures***

Long-Term Plans (2005-2010):

- ***Data communications***
- ***Satellite navigation***
- ***Enhanced surveillance***

THE NAS OPERATIONAL EVOLUTION PLAN

With these issues as the backdrop, the Federal Aviation Administration (FAA) initiated the development of the NAS Operational Evolution Plan (OEP) that integrates and aligns the FAA's activities with those of industry. The intent is to move from consensus on objectives to credible and actionable plans.

- Existing plans from FAA, RTCA, and industry were reviewed
- NASA research activities were integrated
- Objectives and solutions were evaluated against the operational problems
- Commitments to key operational changes by FAA and industry were captured; other targeted operational improvements will be tracked
- Promising research and development will be considered for incorporation into the plan

Delay is concentrated at these airports.

Airport	Annual Arrival Delay Rate*	Average Arrival - Minutes Late
Atlanta	27%	15.4
Boston	33%	19.6
Newark	29%	18.0
Kennedy	29%	16.8
Los Angeles	30%	16.3
La Guardia	42%	26.4
O'Hare	33%	20.0
Philadelphia	30%	16.9
San Francisco	35%	21.9

Source: Aviation System Performance Metrics

*Arriving at the gate more than 15 minutes after scheduled arrival time.

The FAA envisions a system that has increased capacity and flexibility to deal with growing needs where people and equipment operate efficiently and disruptions are averted or quickly resolved.

We must focus community investment on shared solutions.

The commitments and decisions in the OEP will become the basis of the performance plan for the new Air Traffic Services organization. Execution of the OEP will require the coordination of all members of the aviation community, including the airlines, airports, Department of Defense (DoD), National Aeronautics and Space Administration (NASA), and the FAA. Every member of the aviation community holds some responsibility for addressing the demand-capacity gap.

KEEPING PACE WITH DEMAND REQUIRES FUNDAMENTAL CHANGES IN OPERATIONS

To increase capacity and better match available capacity with the demand for air travel, fundamental changes for how aircraft operate are necessary. The changes include operating procedures, technology, airspace design, and airport infrastructure. Changing operations involves new procedures or modifications to existing procedures for aircraft crew members, airline operations personnel, FAA controllers, traffic flow management specialists, and maintenance specialists. New technologies, such as automated decision support aids for controllers and satellite-based navigation, as well as deployment of existing technologies to additional locations, enable operational changes and capacity enhancement. Airspace structures must be redesigned to take advantage of new procedures and technology. A significant increase in the capacity of the air transportation system comes from expansion and improved use of under-utilized airports and new runways.

The mismatch between capacity and demand in the air transportation system can be traced to specific problems related to various operational domains (terminal, en route). Capacity is further degraded by the presence of poor weather conditions. The OEP has grouped capacity-demand problems into four areas:

- Arrival/Departure Rate
- En Route Congestion
- Airport Weather Conditions
- En Route Severe Weather

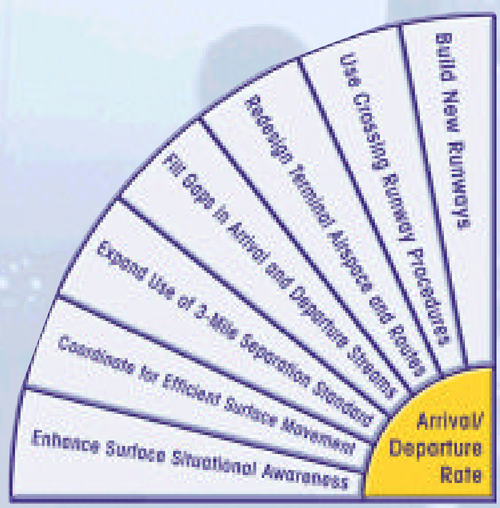
For each of these areas, the OEP identifies specific operational solutions. These solutions depend upon procedures, technology, airspace design, and infrastructure. The implementation of each operational solution requires coordinated FAA and industry actions. These actions require the same emphasis as the Safer Skies and Runway Incursion programs.

The following paragraphs summarize the solutions within the four areas. Details of specific solutions, including schedules and benefits, can be found in the Compact Disc (CD) that accompanies this document. The detailed information is also available through the internet via the NAS Operational Evolution link, found on the FAA home page: www.faa.gov.

MORE ARRIVALS/DEPARTURES AT BENCHMARK AIRPORTS

The FAA has benchmarked the capacity for 31 key airports. These airports serve major metropolitan areas and also serve as hubs for airline operations. As a result, over 70 percent of the passengers move through the benchmarked airports. Most delays are experienced at the benchmark airports.

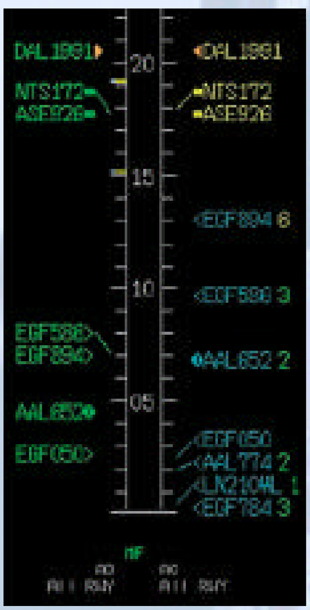
Operational solutions require FAA and industry actions to implement procedures, technology, new airspace designs, and expanded airport infrastructure.



New runways address demand growth for many airports.

Runways add 20 to 50 percent more capacity; LAHSO would add 10 percent at selected airports.

Free Flight tools, airspace, and surveillance changes will improve efficiency.



Spacing efficiency can add up to 10 percent in arrival and departure rates.

Secondary and 'reliever' airports manage 40 to 60 percent of the air traffic in the vicinity of the benchmark airports. The ability of these secondary airports to serve this traffic efficiently is key to successful operations at the benchmark airports. To achieve greater capacity at the benchmark airports, the community must address the needs of these other airports in the regions, and streamline interactions between airports that share common transition airspace.

Additional Runways and Changed Procedures Provide Big Gains

Arrival and departure rates at the nation's busiest airports are constrained by the limited number of runways that can be in active use simultaneously. The addition of new runways at 15 airports between now and 2010 will expand airport throughput at the target airport, and possibly for other airports in the same metropolitan area. In most cases the new runways are sufficient to keep pace with forecast demand. But, half of the benchmark airports will not have new runways.

Another means for increasing the capacity is to make more use of existing runways. Procedures for use of crossing runways under different conditions, Land and Hold Short Operations (LAHSO), are in use at over 200 airports today. These procedures greatly increase the number of arrivals and departures that can be handled without interfering with intersecting traffic.

Efficiencies Can Be Gained by Closing Gaps in Arrival and Departure Streams

Depending on the runway configuration in use at the time, gaps in arrival or departure streams may represent an under utilization of the runways. Gaps generated by inefficiencies in coordinating movements in and around airports reduce arrival and departure rates. Improvements in airspace and route design, air traffic decision support tools, and surveillance technology permit more efficient aircraft spacing.

Designing routes and airspace to reduce conflicts between arrival and departure flows can be as simple as adding extra routes or as comprehensive as a full redesign where multiple airports are jointly optimized. New strategies exist for taking advantage of existing structures to depart aircraft through congested transition airspace. In other cases, area navigation (RNAV) procedures are used to develop new routes that reduce flow complexity by permitting aircraft to fly optimum routes with little controller intervention. These new routes spread the flows across the terminal and transition airspace so aircraft can be separated to optimal lateral distances and altitudes in and around the terminal area. In some cases addition of new routes alone will not be sufficient, and redesign of existing routes and flows are required. Benefits are multiplied when airspace surrounding more than one airport (e.g., in a metropolitan area) can be jointly optimized.

Automated decision support tools provide controllers more information on airport arrival demand and available capacity for making decisions on aircraft spacing. Improved sequencing plans and optimal runway balancing increase arrival and departure rates as much as ten percent. Free Flight tools will help air traffic controllers balance runway use and sequence aircraft according to user preferences and airport capacity.

Current aircraft separation standards allow for 3-mile separation when within 40 miles of a single radar sensor. By identifying opportunities to maximize the use of the 3-mile separation, additional airspace efficiency can be achieved. One effect would be more optimal control of aircraft during transition to and from the airport. Methods to maximize use of the 3-mile separation include: expansion of terminal procedures to surrounding en route airspace at selected single airports, encompassing multiple airports in a single facility with redesigned airspace, and the consolidation of terminal radar approach control facilities (TRACONs). Care must be taken to ensure general aviation access to this airspace is not unduly impaired.

Management of Surface Congestion

The efficiency of aircraft movement on the airport surface is limited by the information available to the controller and pilots. Airport and airline personnel who manage gates or aircraft servicing could also benefit from having this information. This lack of shared situational awareness results in inefficiency in surface movement. Sharing information will improve turnaround time.

New tools for airport surface traffic management will provide airport personnel the capability to predict, plan, and advise surface aircraft movements. Animated airport surface displays for all vehicles on the ground will display information in real time to all parties of interest, supplementing the available visual information. Additionally, improved decision-making capability for air traffic controllers will help balance runway loads more effectively.

The Safe Flight 21 program is addressing cockpit-based tools to supplement existing visual navigation aids and controller communications in the pilot's attempts to accurately determine the aircraft's position on the airport surface. The pilot will be able to correlate fixed obstacles and traffic observed on the display with outside visual information, enhancing the pilot's confidence and efficiency in moving about the airport surface. Over time, the availability of reliable and accurate advisory position and intent information will allow pilots to taxi aircraft under reduced visibility conditions with more confidence, shorter taxi times, and reduced potential for runway incursions.

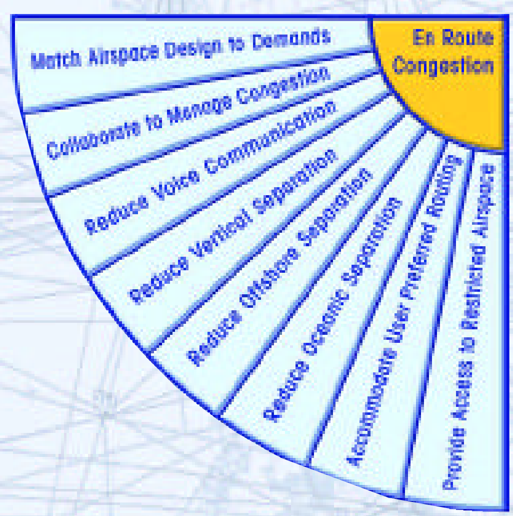
FLEXIBILITY TO AVOID CONGESTION AND RIPPLING EFFECTS

Congestion becomes saturation when traffic levels exceed what can safely be managed given the controller workload and the complexity of the airspace. **The safety of the system can't be compromised.** Flow control measures are taken to avoid crossing the line of what a controller can safely handle. The result: delays originating at a single destination

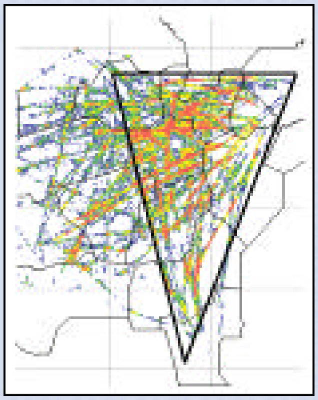
Cockpit-based tools supplement existing visual aids, improving surface movement efficiency.

Safe Flight 21 (SF-21) is a government/ industry initiative to evaluate and validate advanced communications, navigation, and surveillance technologies through operational demonstrations in the Ohio Valley and Alaska

- **Automatic Dependent Surveillance-Broadcast (ADS-B)**
- **Global Positioning System approaches**
- **Weather data to the cockpit**
- **Data link**



New sectors and collaboration provide immediate relief for known choke points.



Aircraft technology enhancements and free flight tools drive national airspace redesign.

can ripple throughout the NAS. Moving traffic into or out of saturated airspace is difficult, and the result is a complex situation where flights are unable to depart because the overhead airspace is saturated, and arriving flights encounter congested airports and blocked gates.

Adapt Resources to High-Demand Areas

Certain areas have highly complex airspace design and traffic flows, and become regular congestion points. Geography plays a large part in where such conditions arise, and therefore the high-demand areas are predictable. Airspace is allocated to controllers as sectors. Airspace assignments in areas that are known congestion points can be redefined or controller assignments modified to distribute the workload and avoid the saturation that leads to delays.

Several of the busiest sectors in the midwest and northeast United States run at or near saturation during the peak hours of the day. Distributing control of the high-demand area will reduce the chance of congestion. The distribution can be done by shifting complex airspace structures (such as holding areas) to less busy sectors, by creating additional sectors in the congested airspace, or by dynamically altering the assignment of controllers to work particular sets of traffic.

By 2010, a more complete redesign of high altitude airspace will include operations changes designed to shift or reduce complexities. This more comprehensive approach will take advantage of new tools and technologies.

Congestion may also appear for brief periods of time at non-routine locations or at different hours of the day. Such congestion may be avoided by sharing predictions with users and allowing them to plan accordingly. Coordination of a game-plan for likely events is done ahead of time to ensure an effective response. Based on results from the collaborative process used for the severe weather season of spring/summer 2000, a program of training has been implemented to prepare controllers, pilots, and airline dispatchers for the spring/summer 2001 activity. Collaborative decision making and information sharing will continue to be emphasized to respond to en route congestion.

Take Advantage of New Aircraft Capabilities

Today's operations are limited by the least capable aircraft and therefore cannot take advantage of the capability to communicate more effectively or navigate more precisely. En route capacity is based on what can be done in moment-to-moment monitoring of an aircraft without advanced communications, navigation or independent surveillance capabilities.

A significant portion of the controller workload is voice communications with the pilots. Application of selective communications services over controller-pilot data link communications reduces the use of en route voice communications. This change frees controller time and makes better use of the voice frequencies resulting in higher sector productivity, and an ability to accommodate the projected growth.

Reducing vertical separation between aircraft can increase the physical capacity of airspace. Demand is highest for cruise altitudes between 26,000 and 41,000 feet (flight levels FL 260 and FL 410). Flights above FL 290 maintain 2000 feet vertical separation, limiting the available cruise range flight levels. The first step for reducing vertical separation will begin with FL 350-390 and progress toward coverage of the full envelope. Flights in this range will have additional options for cruise altitude, providing additional flexibility for the controller and increasing capacity for users in high traffic areas. General aviation aircraft will be allowed to transition through the airspace to reach their desired altitudes.

Improved communications in the Gulf of Mexico will allow the FAA to reclassify that airspace so that domestic procedures and standards can be applied. These reductions allow for the introduction of additional routes in the same amount of space, increasing capacity and efficiency while maintaining or increasing current levels of safety.

Transoceanic flights are confined to airspace based on separation standards that are defined for manual surveillance and unreliable communications. Allowing properly equipped aircraft to operate at reduced oceanic separation will enable more aircraft to fly optimal routes, enhancing aircraft time efficiency in the oceanic leg of their flight. Reduced separation laterally may provide space for additional routes to current destinations or new direct markets. Reduced longitudinal (nose-to-tail) separation will provide more opportunity to add flights without a delay or speed penalty.

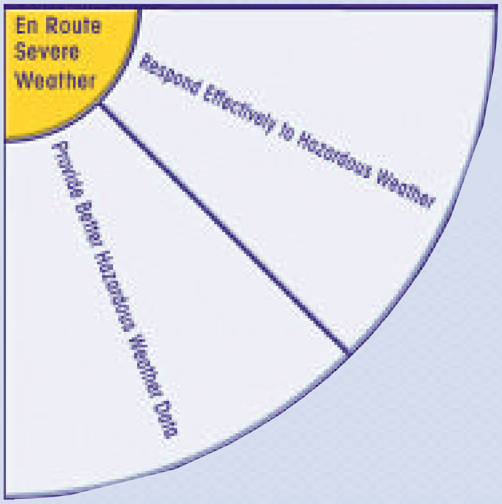
Allow More Flexible Routing

Tools that would allow the controller to more easily manage complex traffic flows will increase the flexibility for routing. This, coupled with the availability of alternative airspace and routes, will support user efforts to avoid congested areas.

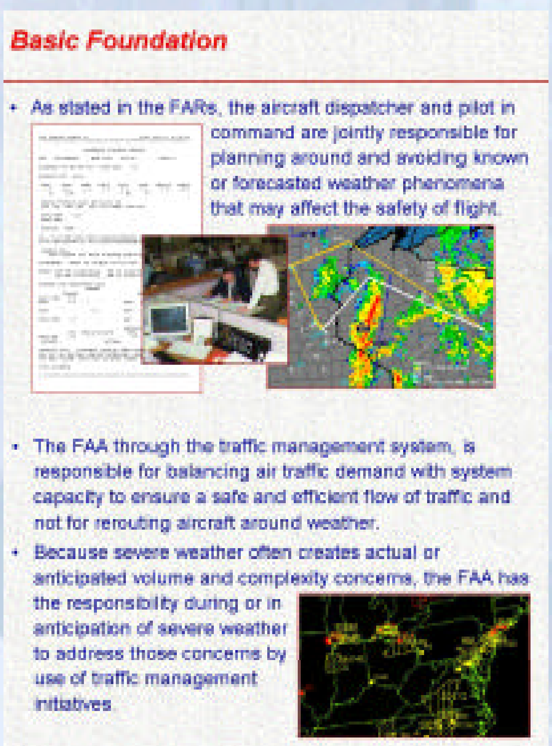
Today, controllers have a view of the airspace that is bounded by the sector that they control. Fixed airspace structures used to organize flows and create predictable intersections are necessary for moment-to-moment control. These structural limitations in some cases result in under utilization of some airspace even as adjacent airspace may be congested. A more strategic look across multiple sectors with conflict detection tools and the flexibility granted the users in the national route program should decrease the concentration of flights. However, in some cases the structure may actually enhance the efficient use of airspace. A careful balance of sufficient, predictable flows and controller look-ahead is required to ensure that flexibility does not simply shift the point of congestion to other sectors.

The availability of special use airspace (primarily airspace reserved for military use) is often not known in time to be of any value as an alternative route for civilian flights. More effective distribution of this information to service providers, pilots and air carriers will increase the practical use of this airspace as a means to avoid congested areas. Negotiation among the stakeholders and trials of standing plans for access to specific areas such as the Buckeye military area and the Virginia Capes area are underway.

Given sufficient warning, users can avoid congested areas.



Controllers and dispatchers play a key role in reducing the effect of forecast uncertainty.



USER FLEXIBILITY TO MANAGE CONTINGENCIES

When contingencies such as severe weather arise, flight planning and flow management actions change real-time in response. Yet the current ability to forecast thunderstorm activity provides erroneous results almost 70 percent of the time. The key need is an improved weather forecast based on the science of convective weather growth, decay, movement, intensity, and coverage. For the present, improved decision coordination will provide a more cohesive response to weather.

Joint Planning to Reduce Effects of Uncertainty

The disruptions caused by hazardous en route weather are magnified by the uncertainty in the location, movement, and severity of the weather conditions. Forecast accuracy is not well suited to the strategic planning of traffic flow decisions. Joint planning is further hindered by limitations in real-time data sharing capabilities. Operational decision making by airlines and traffic flow managers will be improved based on common awareness of the situation, coupled with the improved data exchange, training, and coordination processes which are being applied to the overall en route congestion problem.

Finding the Best Routes Around Weather

Managing the routes of aircraft, and particularly adjusting routes quickly to avoid hazardous weather conditions without disruptions to traffic flows, is difficult in today's environment. This leads to inefficient use of available airspace and unnecessary congestion and delays. Some sources of the difficulty are: rigid airspace and route structures; incompatibilities among automation systems used by airlines, aircraft flight management systems, and air traffic management; and cumbersome processes for modifying flight plans and communicating the changes quickly. Operationally, the solution involves improved weather prediction and forecast distribution, more flexibility in routing, faster identification of airspace and flights impacted by weather, common availability of current information among all participants in the planning process, and procedures and training to support the collaborative adjustment of routes to ensure safety while maintaining traffic flows. A program of training for controllers, pilots, and airline dispatchers has been instituted to prepare for the severe weather season of spring/summer 2001. Annual reviews of what works and what needs to be adjusted in the collaborative process will lead to continuing refinements each year.

SUSTAINED TERMINAL THROUGHPUT IN ALL WEATHER CONDITIONS

Arrival and departure rates at an airport are reduced significantly by weather conditions, including reduced visibility, high winds, and precipitation. As visibility and cloud height drop, the use of certain runways becomes restricted and arrival rate can be cut in half. Departures are also impacted when an airport loses use of a runway. The effects can ripple out and cause coast-to-coast delays.

All Weather Capability at Airports

The reduction in arrival and departure rates as weather deteriorates is primarily due to loss of optimal runway configurations, either because of runway spacing or inadequate instrument approach capabilities. The solution is to apply technology and procedures to retain use of closely spaced runways and to increase the instrument approach capability. Instrument approach procedures will be published for runways that are capable of supporting them. By 2006, procedures will be completed for all scheduled air carrier airports.

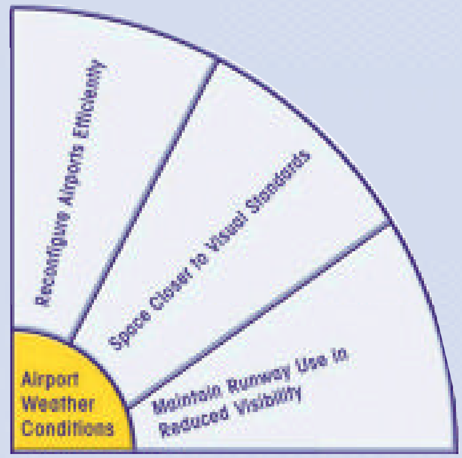
Capability will continue to increase as satellite navigation services become universally available over the United States airspace with upgrades to support instrument approaches. Airport improvements in runways, markings, and airport lights are necessary to match this increasing capability for approaches in poor visibility.

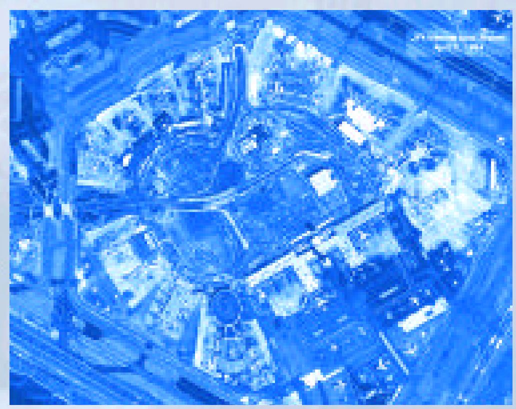
Procedures for visual approaches require that the pilot visually acquire nearby aircraft as well as the runway. In marginal visibility conditions, pilots may have difficulty visually acquiring the runway or nearby aircraft, reducing arrival rates. Cockpit tools and displays can help to achieve higher throughput by enabling more rapid identification of aircraft, reducing the need for additional communications between the pilot and controller to advise on traffic. The cockpit display indicates target aircraft and trajectory information which the pilot can correlate to what is visible, providing faster target identification and helping the pilot maintain visual separation.

Quick Reconfiguration for Weather

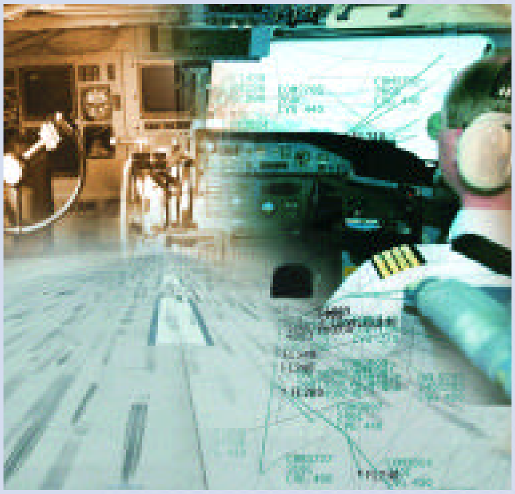
Changes in wind direction over airport runways, and the onset or end of hazardous weather in the vicinity of the airport often require changes to airport arrival and departure configurations. Weather changes can result in a significant disruption of traffic flow if required configuration changes are not known in advance. With improved airport weather observations and predictions, traffic flow configurations can be proactively planned and coordinated between personnel at all of the involved air traffic control and airline operations facilities. The result will be smoother reconfigurations, optimization of traffic flow and reduced congestion at the airport. Prototypes are currently being used for this purpose at six airports. By the end of 2003 the enhanced reconfiguration capabilities will be available at 34 sites covering 47 airports.

Reducing the impact of weather on arrival and departure rates is the long-term answer.





Well orchestrated changes save half a million minutes of delay each year at Newark, Kennedy, La Guardia, Dallas/Ft. Worth, and Memphis



Near Term Solutions focus on:

- ***Resolving choke points***
- ***Coordinating operational decisions through Spring 2001***

HOW WILL THE NAS EVOLVE BETWEEN NOW AND 2010?

NEAR-TERM (2001)

Airport Surface

Better distribution and coordination of airport-specific tactical information coupled with limited runway improvements increase airport capacity. Specifically:

- New runways at Detroit and Phoenix

Terminal Area

Improved terminal traffic patterns and more efficient arrival flows combine to improve terminal capacity. Specifically:

- Additional precision approach runways at 14 airports
- Closely-spaced parallel runway monitor at Philadelphia and Kennedy sustain operations as visibility and ceiling decrease

En Route

Airspace redesign efforts result in a reduction in the number of static choke points and improved regional traffic management. Specifically:

- De-coupling holding areas from en route flows in the Great Lakes Corridor decreases routing complexity
- Expanded use of special-use airspace, including Buckeye and VACAPES, through improved information-sharing increases routing options
- Creation of sectors to better balance controller workload, reducing the need for flow constraints
- Limited dynamic resectorization enhances options to manage congestion, weather and access to special use airspace at 5 centers

Traffic Flow Management

Enhanced congestion and weather management tools allow for earlier prediction of congestion problems and evaluation of potential resolutions. Airspace users begin to accept a more collaborative role in resolving conflicts. Specifically:

- Shared FAA/user flight plan and situational awareness information increases collaboration opportunities
- Metering and merge planning capability at as many as seven centers optimizes airspace use

- Improved predictability of traffic congestion and the options for its resolution enhance effectiveness of traffic flow management
- Expanded congestion management menu options, initial and recurrent training for congestion mitigation processes, and post-event performance analysis and feedback improve collaborative congestion decision-making
- Improved dissemination of common weather information to FAA and user facilities improves planning efficiency

MID-TERM (2002 through 2004)

Airport Surface

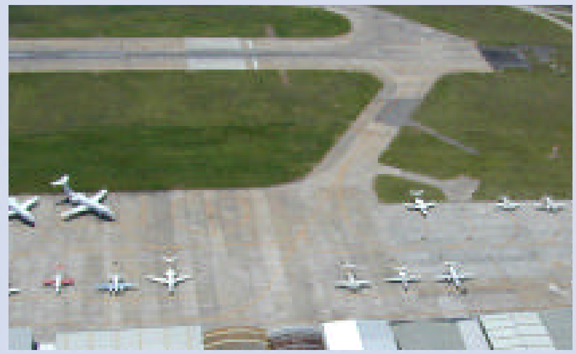
Distribution and coordination of airport-specific tactical information on a larger scale coupled with increased numbers of runway efficiency improvements further increase airport capacity. Specifically:

- New runways or extensions at six of the top 31 airports: Houston, Minneapolis, Miami, Orlando, Charlotte, Denver
- More efficient use of parallel and crossing runways (as well as more arrival runways in general) increases airport arrival/departure capacity
- Coordinated management of surface movement at a larger number of airports increases efficiency of movement on airport surface in all weather
- Improved runway reconfiguration coordination between facilities and carriers reduces flow disruptions in the transition

Terminal Area

Optimized terminal boundaries, improved multi-airport traffic patterns, more efficient arrival flows, improved runway balancing, improved reconfiguration information sharing, arrival/departure routes matched to aircraft capabilities, and reduced air/ground (A/G) communications combine to further improve terminal capacity. Specifically:

- Site-specific expansion of terminal airspace through expanded terminal procedure applications reduces separation requirements in the vicinity of selected airports
- Consolidation of selected TRACONs reduces controller coordination complexities
- Fewer voice communications through pre-planned arrival/departure routes at more airports reduces pilot and controller workload constraints
- Increased number of RNAV-based arrival/departure routes, routes with speed control, and routes that better match procedures to aircraft capabilities, increase arrival/departure capacity



Optimize operations by:
- ***Better use of runways***
- ***Airspace redesign***
- ***Widespread use of Free Flight tools***

Free Flight Phase 1 (FFP1) provides limited deployment of five core capabilities:

- **User Request Evaluation Tool**
- **Traffic Management Advisor**
- **Passive Final Approach Spacing Tool**
- **Collaborative Decision Making**
- **Surface Movement Advisor**

Free Flight Phase 2 (FFP2) provides geographic expansion and enhancement of selected FFP1 capabilities, plus

- **Implementation of collaborative routing tools**
- **Initial pilot-controller data link**
- **Acceleration of priority research**

- Additional precision approach runways and use of closely-spaced parallel runways in poor weather reduce the gap between Instrument Meteorological Conditions (IMC) and Visual Meteorological Conditions (VMC) throughput at a greater number of airports
- Redesigned single- and multiple-airport arrival/departure flows with greater flexibility, including routes that take advantage of less-congested altitudes, enhance regional throughput in transition from en route
- Efficient use of arrival/departure runways at more airports through a balanced distribution, including runway assignments and improved sequencing, closes gaps in arrival/departure traffic streams

En Route

Expanded airspace redesign efforts coupled with more efficient pilot-controller communications result in further reduction of choke points and improved regional traffic management. Specifically:

- Alternative routes independent of ground navigation infrastructure and reduced vertical separation minima provide more efficient and flexible ways to move aircraft through the NAS
- De-coupling holding areas from en route flows as part of the Potomac redesign decreases routing complexity
- Expanded use of additional special-use airspace through further improved information-sharing increases routing options
- Expanded airspace redesign, including the consolidation and redistribution of sectors, reduces flow constraints due to controller workload
- Limited dynamic resectorization at more locations enhances options to manage congestion
- Handling of routine communications via data link reduces pilot and controller workload

Traffic Flow Management

Enhanced congestion and weather detection/management tools and the collaborative development of improved tactics for severe weather response allow for earlier prediction of congestion problems and evaluation of potential resolutions. Increased reroute choices and more precise identification of impacted flights improve response effectiveness. Airspace users take an even greater collaborative role in resolving problems. Specifically:

- Early conflict identification and resolution at as many as five additional centers coupled with metering and merge planning at up to five additional centers optimizes airspace use
- More widely shared FAA/user flight plan and situational awareness information increase collaboration opportunities

- Improved predictability of traffic congestion and the options for its resolution at more locations enhance effectiveness of traffic flow
- Expanded congestion management menu options, initial and recurrent training for congestion mitigation processes, and post-event performance analysis and feedback continue to improve collaborative congestion decision-making
- Improved weather sensors and controller weather displays provide for timely identification of reroutes
- Collaborative development of improved tactics for responding to severe weather coupled with increased efficiency of flow related reroutes and more precise identification of impacted flights improves effectiveness of reroute decisions
- Continued improvement in dissemination of common weather information to FAA and user facilities improves planning efficiency
- Strategic weather products that reflect aviation needs/decisions allow users to optimize flight planning

LONG-TERM (2005 through 2010)

Airport Surface

Cockpit displays and enhanced surface-surveillance systems improve movement efficiency and robustness. Specifically;

- New runways at another six of the top 31 airports: Atlanta, Cincinnati, Dallas Ft. Worth, Dulles, St. Louis, and Seattle
- Surface navigation using cockpit display to augment visual data and provide common situational awareness improves robustness and efficiency
- Enhanced surface management coordination increases efficiency of movement on airport surface in all weather
- Improved runway reconfiguration coordination between facilities and carriers across adjacent airports reduces flow disruptions in the transition

Terminal Area

Increased runway balancing, cockpit-maintained (Air Traffic Control [ATC]-assigned) spacing matched to aircraft capability, optimized terminal boundaries, improved multi-airport traffic patterns, improved reconfiguration information sharing, and more efficient communications combine to further improve terminal capacity. Specifically:

- Continued site-specific expansion of terminal airspace through expanded terminal procedure applications reduces separation requirements in the vicinity of selected airports
- Transition to single facility operations in the New York area and the continued consolidation of selected TRACONs reduces controller coordination complexities

Take advantage of aircraft capabilities for satellite navigation, vertical separation, data communications, and dependent surveillance.

- More RNAV-based arrival/departure routes that better match procedures to aircraft capabilities increase arrival/departure capacity
- Pilot/controller coordination through common situational awareness allows safer and more efficient operations
- Cockpit displays aid the pilot in earlier visual acquisition of terminal traffic, permitting visual procedures to be extended in marginal weather conditions
- Additional precision approach-equipped runways and closer spacing of arrivals further shrink the gap between IMC and VMC throughput
- Efficient use of arrival/departure runways at more airports through a balanced distribution, including runway assignments and improved sequencing, closes gaps in arrival/departure traffic streams
- Redesigned multiple-airport flow interactions and metering in complex airspace enhance regional throughput in transition from en route
- Multiple arrival/departure route options among a greater number of adjacent airports provide greater intra-airport flexibility

En Route

Expanded airspace redesign efforts coupled with more efficient pilot-controller communications and Automatic Dependent Surveillance (ADS)-based spacing (for suitably-equipped aircraft) result in improved regional and (limited) national traffic management. Specifically;

- User-preferred routing optimizes route selection to fit user requests in areas where tools and A/G communications support it
- Increased numbers of direct routes and increased altitude options provide more efficient and flexible ways to move aircraft through the NAS
- High altitude airspace sectors are reconfigured to reduce boundary transition complexities and allow controllers more room to maneuver aircraft
- Traffic flow separation by altitude via Reduced Vertical Separation Minima (RVSM) continues to increase routing flexibility
- De-coupling holding areas from en route flows as part of the NY/NJ/PHL redesign decreases routing complexity
- ADS-based separation over ocean allows reduced horizontal separation
- Handling of ATC instructions and clearances via data link reduces pilot and controller workload

Automatic Dependent Surveillance-Broadcast (ADS-B) is an essential enabling technology

Aircraft avionics transmits position information, along with aircraft identification, altitude, velocity, and possibly intent data to ground systems and other aircraft using data link communications.

Traffic Flow Management

Enhanced and more widely-used congestion and weather detection/management tools and the collaborative development of improved tactics for severe weather response allow for a more proactive response to complex conflicts. Increased reroute choices and more precise identification of impacted flights improve response effectiveness. Airspace users continue to take on a greater collaborative role in resolving problems. Specifically;

- Ability to resolve complex traffic flow conflicts coupled with expansion of metering/merge planning across multiple centers and conflict planning at up to nine additional centers enables greater flexibility in airspace use
- Continuous improvement of collaborative decision-making processes reduces disruptions in traffic flow due to severe weather and congestion

Cost of a new runway at a major airport:

- ***$400M to $1B per runway***
- ***Community commitment and recognized importance of air transportation both locally and nationally.***

REQUIRED INVESTMENT

The operational evolution described in the plan will require significant investments on the part of the federal government, airport authorities, and airspace users. Over the period 2001 to 2010, the FAA will spend approximately $11.5 billion for facilities and equipment to enhance capacity. Based on current estimates FAA will spend approximately $77 billion in operations to deliver services. The FAA will make every effort to request the funding needed to support growth. In addition, the FAA through the Airport Improvement Program provides approximately 35 percent of the cost of airport infrastructure improvements. The runways planned represent a total investment of over $5 billion, with the federal share over $1.7 billion.

Additionally, as part of the federal government commitment, NASA will invest approximately $900 million over the period 2001 to 2010 conducting research on technologies to improve the nation's air transportation system. A significant portion of the funds are in direct support of the OEP defined products, the remainder is addressing higher risk innovations that could lead to even greater increases in system capacity and could influence the future evolution of the OEP. These efforts will be coordinated through the joint FAA/NASA Interagency Integrated Product Team (IAIPT). As research matures and can move toward implementation, the OEP will be modified to provide schedules, costs, benefits, and locations.

Airline and general aviation investments include avionics to improve communications, navigation, and surveillance. **Before benefits can be fully realized, aircraft must be sufficiently equipped to allow controllers to provide improved services. Mixed equipage makes it extremely difficult to provide better services during peak demand where some aircraft have the additional capability but others do not.** Challenges also exist for the DoD to make the needed avionics investments to realize benefits.

The FAA has adjusted priorities in FY01 to focus on choke points, improved collaboration, and production of arrival and departure procedures. The President's budget for FY02 includes near-term improvements and adds 75 certification positions. The FY02 budget also requests funds to hire over 1,000 controllers with a net increase of 600 controllers. **Funding and staffing are being aligned to support the FAA's commitments in the OEP.**

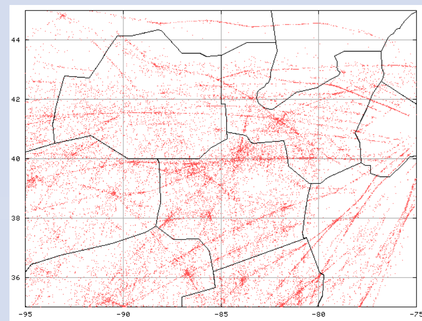
WHAT IMPACT WILL THESE CHANGES HAVE ON CAPACITY?

The performance of the NAS depends upon the balance between capacity and demand and the geographic distribution of any imbalances. By 2010, there will be 700 to 800 more commercial flights in the air at a given time during normal operating hours, about a 30 percent increase from today. En route capacity affects NAS performance through limits on traffic flows between airports. The key driver for en route capacity is the ability of the controller to direct aircraft, when needed, by vectoring traffic, changing altitudes or exercising speed control. The targeted improvements for en route airspace provide substantial reductions in interactions between flights and in communications workload, thus reducing the number of controller-to-pilot directives. Projections show airspace redesign, reduced vertical separation, RNAV routes and en route automation aids provide a 30 to 40 percent reduction in the number of interactions. The reduced number of interactions and ability of the controller to plan more strategic maneuvers through conflict predication tools allow restrictions to be removed and lessens the impact when controllers must intervene to resolve a conflict. The airspace redesign combined with new operational tools such as dynamic sector changes, RNAV routes, conflict detection, and RVSM should be able to convert the reduction in flight interactions into sufficient capacity to mitigate en route congestion.

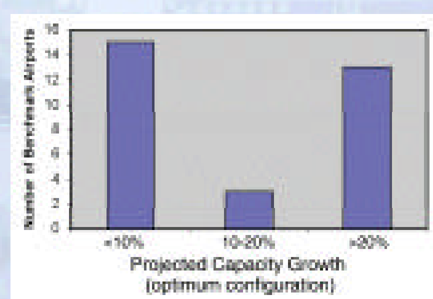
Almost half of delays and cancellations experienced across the NAS are due to disruptions from en route severe weather and our inability to predict its location, movement, and severity. Today's forecasts are accurate less than a third of the time, meaning many restrictions and cancellations are mistimed or done for improper locations. Collaboration on plans and more precise identification of flights that would be impacted by severe weather will result in a relaxation and removal of miles-in-trail (MIT) volume restrictions, and improved re-routing/MIT assignment for those aircraft affected. Studies have shown that up to 40 percent of the delays and cancellations may be recoverable, but the actual percentages that will be achieved through OEP actions are uncertain. Estimates indicate the savings that can be achieved through the planned collaboration may be about half a million minutes per year, or approximately 7.5 percent of the delay during the severe weather season.

The FAA Terminal Area forecast anticipates about 11,000 more scheduled operations per day at benchmark airports, or a 24 percent increase by 2010. Secondary and reliever airports in the metropolitan areas of the benchmark airports are projected to handle 7700 additional operations per day by 2010 to help offload the growth. To understand the impact the operational changes will have, we must examine the balance between capacity and demand by location. With the operational changes, about half of the benchmark airports will have growth in capacity sufficient to meet or exceed the predicted demand. Airports with new runways and procedural changes that make better use of runways show the largest capacity gains.

Interactions between flights and the need for controller intervention are reduced by 30 to 40 percent, allowing controllers to handle the projected traffic growth.



Capacity typically grows by 20 to 50 percent at airports with new runways.



					With OEP Enhancements	
Airport	**Annual Operations (000)**	**Demand Growth 2010 (Benchmark)**	**Capacity Benchmark Optimum Hourly Rates**	**Capacity Benchmark Reduced Hourly Rates**	**% Capacity Growth in Optimum Rate (2010)**	**% Capacity Growth in Reduced Rate (2010)**
ATL	913	28%	185 - 200	167 - 174	37%	34%
BOS	508	6%	118 - 126	78 - 88	4%	4%
BWI	315	27%	111 - 120	72 - 75	0%	0%
CLT	460	15%	130 - 140	108 - 116	30%	24%
CVG	478	40%	123 - 125	121 - 125	28%	27%
DCA	343	4%	76 - 80	62 - 66	4%	8%
DEN	529	23%	204 - 218	160 - 196	25%	17%
DFW	866	21%	261 - 270	183 - 185	4%	21%
DTW	555	31%	143 - 146	136 - 138	31%	24%
EWR	457	20%	92 - 108	74 - 78	10%	7%
HNL	345	25%	120 - 126	60 - 60	2%	7%
IAD	480	20%	120 - 121	105 - 117	49%	60%
IAH	491	34%	120 - 123	112 - 113	42%	41%
JFK	359	18%	88 - 98	71 - 71	2%	3%
LAS	521	30%	84 - 85	52 - 57	0%	12%
LAX	784	25%	148 - 150	127 - 128	11%	4%
LGA	392	17%	80 - 81	62 - 64	10%	3%
MCO	366	42%	144 - 145	104 - 112	28%	38%
MEM	386	30%	150 - 152	112 - 120	3%	4%
MIA	517	23%	124 - 134	95 - 108	24%	27%
MSP	522	32%	115 - 120	112 - 112	34%	31%
ORD	909	18%	200 - 202	157 - 160	6%	12%
PHL	484	23%	100 - 110	91 - 96	17%	11%
PHX	639	31%	101 - 110	60 - 65	40%	60%
PIT	448	15%	140 - 160	110 - 131	3%	1%
SAN	208	33%	43 - 57	38 - 49	2%	3%
SEA	446	17%	90 - 91	78 - 81	57%	51%
SFO	431	18%	95 - 99	67 - 72	0%	3%
SLC	367	34%	130 - 132	95 - 105	5%	4%
STL	484	30%	104 - 112	64 - 65	27%	89%
TPA	279	15%	110 - 119	80 - 87	0%	19%

Source: Airport Capacity Benchmark Report 2001, FAA.

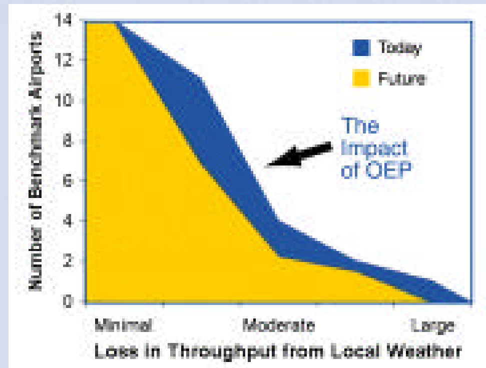
At specific locations there will be shortfalls unless we take advantage of underutilized airports and multipimodal trans-poration.

Where new runways are not in development, efforts to eliminate inefficiencies in arrival and departure streams with new technologies and improved procedures will help. For these locations the growth in capacity is typically less than 10 percent.

Some of these airports will experience a shortfall in capacity growth. These shortfalls can be addressed in a number of ways: adding new solutions to the plan as they mature, adding hours of airport operation, adjusting scheduling and aircraft size, or use of altemate airports to meet metropolitan area demand coupled with multi-modal transportation.

Although the number of scheduled flights does not vary appreciably from day to day due to weather conditions, when an airport experiences bad weather, airport capacity decreases by over 50 percent in some cases. The OEP actions provide a relatively larger growth in capacity for these days (over good weather days), effectively shrinking the gap in throughput between airport optimal and reduced visibility conditions.

Local airport weather becomes less of a factor in performance of the NAS.



THE CHALLENGE OF EXECUTION

FAA APPROACH

The OEP was initiated to focus community attention on operational problems limiting the capacity of the system. The OEP is a vehicle for coordinating goals, actions and decisions of the stakeholders to address system limitations and the public's air transportation needs. Community agreement on the plan will clarify the responsibilities of the individual members of the aviation community and help to establish a climate of accountability throughout the industry.

The OEP complements the NAS Architecture. **The OEP focuses on capacity-demand issues, while the architecture is the comprehensive plan for NAS infrastructure modernization.** It describes the evolution of NAS services and the corresponding needs for investment in infrastructure.

The OEP is a living document, updated as key decisions are reached, risks are mitigated, or discoveries are made for new solutions to the operational problems. In this way, the plan serves to harmonize activities and foster agreement on a collective course of action. By sharing common criteria for success, we can bridge the competing interests of the community at large.

OVERSIGHT AND MANAGEMENT

The OEP is outcome driven with clear lines of accountability within and between FAA organizations. An outcome is a measured benefit(s) that can be realized through changes described in the plan. The FAA budget will be aligned to support the evolution as the agency's commitment to providing improved services.

As the FAA establishes the Performance Based Organization (PBO), the plan forms the basis for the capacity and demand objectives of the PBO, the Administrator, and the current FAA lines of business. Delivery of new capabilities will require action by organizations that are not part of the PBO. By being focused on operational outcomes that can be measured, both FAA and community progress can be tracked and managed.

The OEP Team, made up of senior FAA leaders and chaired by the Acting Deputy Administrator, will lead overall implementation. This team is responsible for policy, priorities, monitoring benefits and the metrics used to manage improvements, and engaging aviation community leaders in key decisions. The DoD will participate in the overall process to facilitate meeting national security requirements. Periodic operational implementation reviews will be conducted and industry will be invited to participate, including reporting on their progress in meeting commitments to improve capacity and efficiency of the NAS.

The aviation community has frequently called for single-point accountability for FAA initiatives. The specific improvements identified in the

OEP have been assigned to seven executives who are the leaders of the principal organizations responsible for delivery of these outcomes. These seven executives have support from other organizations who are delivering key elements of the outcomes. Performance agreements and incentives to deliver the improvements will link these executives and their organizations together around common expectations and schedules. These executive performance agreements are tied to the goals and performance agreements of the FAA.

The RTCA Free Flight Steering Committee will be asked to facilitate and coordinate the industry alignment to the plan, and to seek consensus on the evolution.

The operational evolution is an extension of the NAS architecture that will be modified to include costs, schedules and risks associated with the evolution. To assure widest possible involvement and accountability, status reporting on implementation will be available through the Internet.

WHAT IS EXPECTED OF THE COMMUNITY?

The aviation community has participated in the development of the OEP through the NAS Operational Evolution web site, and a variety of public forums. Industry participation must continue for consensus to be maintained. For example, airspace user and manufacturer feedback on projected demand, capacity enhancement objectives, the pace of evolution, and decision criteria will be most helpful in moving forward. Pilot and controller insights into the operational feasibility and appropriate balance of workload for the proposed changes are essential to ensure valuable energy is not spent on impractical solutions. Successfully achieving the operational changes will require commitments from all members of the aviation community.

It is also critical to look at how airlines translate passenger needs to a schedule of flights and fleet mix.

Coordinated community action can result in advances that provide real capacity gains. The transition from consensus to action will require community stakeholders to participate as members of the team and to take ownership in making these solutions real. The FAA will continually engage stakeholders on public policy issues and decisions. These sessions will be used to share and understand perspectives on problem areas, user needs, implications of solutions, key decisions and criteria for decisions. Operational details will be worked in forums to be identified for each solution area. Assignments will be made to focus on refining performance objectives and tracking progress on changes, decisions and risks. Finally, the plan and its resulting actions will be shared with the public at large on a routine basis through journals, press releases, papers, and related web sites.

The community must share a common understanding of the impact of proposed changes to reach joint decisions on the evolution of the operations. Pilots and controllers need to understand the proposed operational changes and have confidence that these new procedures are safe and do not increase workload. This plan calls for a series of joint pilot and controller simulations beginning in 2002 that will demonstrate all operational changes. This is preferred over individual simulations of isolated scope, which may yield varied results and fragment the community.

Airlines, NASA and DoD will be encouraged to participate in these human-in-the-loop simulations. The overall objective is to replicate expected changes in as complete of context as possible, so that as a community we can come to terms with differences in understanding early and reach agreement on procedures and performance improvements.

BEYOND THE OPERATIONAL EVOLUTION PLAN TIME FRAME

This plan represents a commitment by the FAA in agreement with the aviation community on specific actions and outcomes (the Appendix shows timelines). It is a foundation for research, infrastructure implementation, and airline action to meet future growth. Not all present activities will conclude or result in capacity gains by 2010.

One of the key goals of the FAA and the user community is to increase system capacity in all weather conditions, and to reduce the impact of weather variations on system operations. The FAA and the airframe and equipment manufacturers are all committed to identifying and fielding new breakthrough technologies that can achieve the goal of safely adding capacity in all weather conditions. The FAA is committed to enhancing the system capacity by adding proven breakthrough technologies, strategies or equipment as fast as possible.

The FAA and its research partners have demonstrated their resolve to develop new technology required for NAS modernization. These technological developments have been part of the movement toward "Free Flight". As a major FAA research partner, NASA, under their new AvSTAR program, will build upon existing research and technology development to help provide additional operational capabilities in the future. While many of NASA's initiatives are part of the Free Flight program being implemented under this OEP, others are expected to be implemented in the longer term--beyond the ten year timeframe of this plan. Nevertheless, enabling technologies from NASA and other sources, form the bridge between current and next-generation Free Flight capabilities.

There are actions which the airlines must consider in terms of schedule, aircraft size, and pricing structure, that will impact on capacity-demand imbalance, these will always be constrained by the business need to achieve profitability.

Another set of potential long-term solutions involves airport infrastructure; moving beyond new runways to consider greater use of underutilized airports, conversion of military airfields to civilian use, and even construction of new airports. The FAA will support such actions to expand capacity consistent with other priorities.

The DoD and the FAA enjoy a long history of federal partnership established by public law. This continuing partnership is reflected in the OEP and associated actions. FAA senior leadership and the DoD Policy

Board on Federal Aviation will jointly address national security issues ensuring DoD training and operational requirements are met.

Beyond 2010, we must have an aviation system that is integrated with other modes of transportation, and one that takes advantage of existing under utilized runway capacity and locations.

NAS Operational Evolution - Capacity Enhancements
Summary of Responsibilities and Required Actions

	Airlines	FAA	Airports
Near-Term (2001)	• Reach agreement with pilots on LAHSO procedures and assumptions • Training on Closely Spaced Approach procedures • Improve quality of data and participation in Spring 2001 collaboration • Participate in Spring 2001 training • Improve information dissemination to passengers • Improve and share demand forecast data • Reevaluate scheduling practices at congested airports	• Runway incursion training and awareness for controllers • Conduct Safety Analyses for LAHSO • Parallel runway monitors at selected airports • Improve dissemination of routing information and weather to facilities • Develop and conduct Spring 2001 training • Resolve airspace choke points by adding new sectors and moving flows in NE • Improve currency and accuracy of SUA status information and expand internet access • Streamline EIS processes • Improve information dissemination to passengers • Expand use of 3-mile separation standard where applicable • Start FFP2 program	• New runways at Detroit and Phoenix • Additional precision approaches at 14 airports • Work with communities to implement capacity plans • Streamline EIS processes • Improve information dissemination to passengers
Mid-Term (2002-2004)	• Accelerate equipage to take advantage of RNAV routes and approaches • Ensure uniform datalink equipage • Reevaluate scheduling practices at congested airports	• Expand implementation of area navigation procedures (RNAV) • Provide staffing and equipment for new runways • Parallel runway monitors at selected airports • Comlete FFP1 program • Expand airspace redesign, start to implement RVSM • Complete WAAS Phase 1 (LNAV/VNAV) • Implement LAAS approaches • Add datalink and ADS-B capabilities	• New runways/ extensions at Houston, Minneapolis, Miami, Orlando, Charlotte, Denver • Improve surface management process and coordination • Start LAAS implementations • Add signs and lighting at smaller airports to take advantage of new navigation systems
Long-Term (2005-2010)	• Equip for enhanced situational awareness on airport surface • Equip and train for new LAAS systems	• Transition to single facility operation in New York • Continue TRACON consolidation • Implement RVSM • Complete WAAS Phase 2 • Expand use of datalink for ATC	• New runways and taxiways at Atlanta, Cincinnati, Dallas, St. Louis, Seattle, Dulles • Enhance surface congestion management • Continue to add capacity through taxiway and runway enhancements

Acronyms

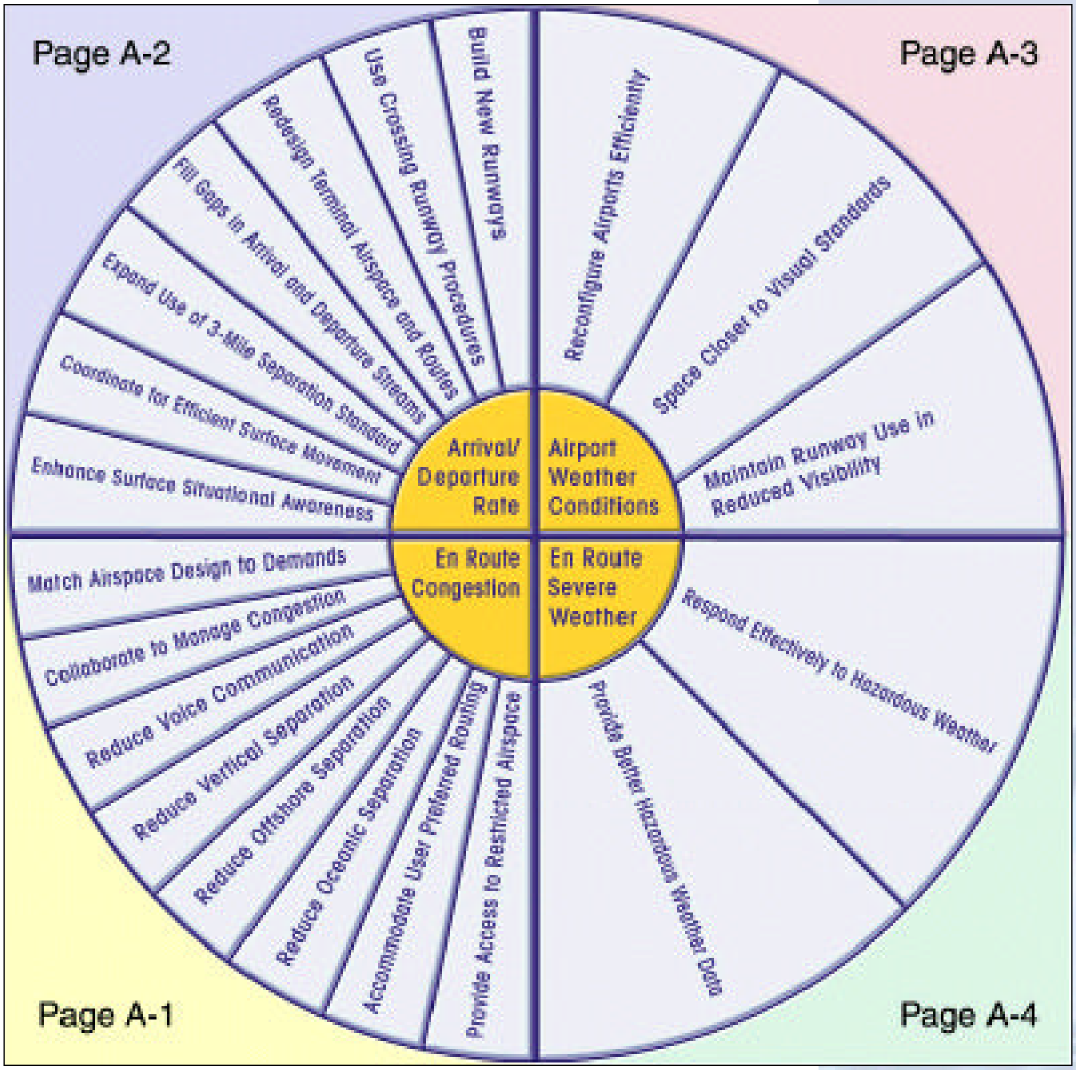
A/G	Air/Ground
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance-Broadcast
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATL	Atlanta Hartsfield Airport
CAT I	Category One Landing
CAT II/III	Category Two/Three Landing
CCSD	Common Constraint Situation Display
CD	Compact Disc
CPDLC	Controller Pilot Data Link Communications
CRCT	Collaborative Routing Coordination Tools
D2	Direct-to
DFW	Dallas/Fort Worth International Airport
DOD	Department of Defense
DSP	Departure Spacing Program
DSR	Display System Replacement
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
FCA	Flow Constrained Area
FFP1	Free Flight Phase 1
FFP2	Free Flight Phase 2
IAIPT	Interagency Integrated Product Team
ID	Identification
IMC	Instrument Meteorological Conditions
IOC	Initial Operating Capability
ITWS	Integrated Terminal Weather System
LA	Los Angeles
LAAS	Local Area Augmentation System
LAHSO	Land and Hold Short Operations
LAX	Los Angeles International Airport
LDR	Limited Dynamic Resectorization
LNAV	Lateral Navigation

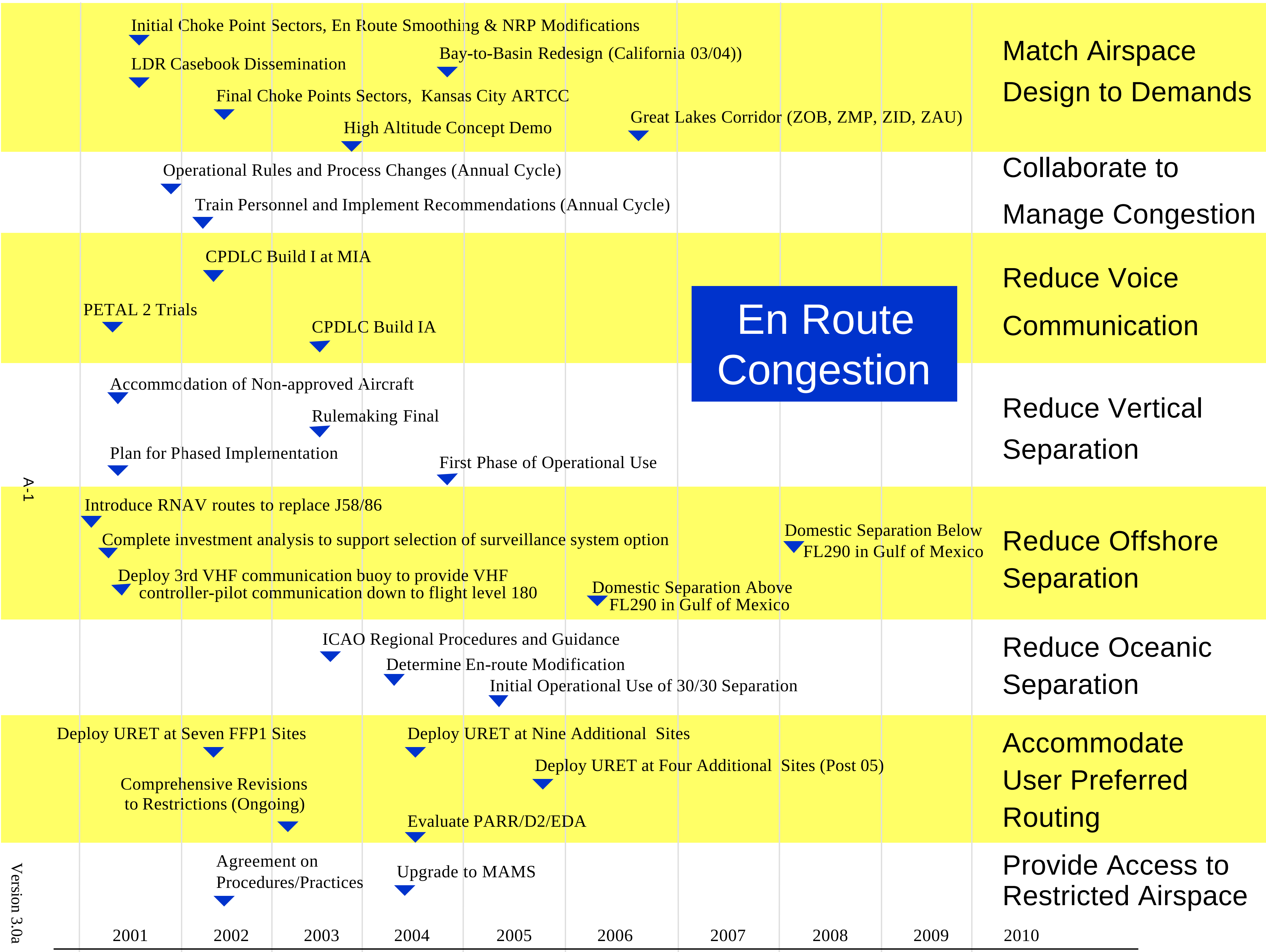
Acronyms (Concluded)

MAMS	Military Airspace Management System
MIA	Miami International Airport
MIT	Miles-in-Trail
MSP	Minneapolis-St. Paul Airport
NASA	National Aeronautics and Space Administration
NAS	National Airspace System
NE	Northeast
NY/NJ/PHL	New York/New Jersey/Philadelphia
OEP	Operational Evolution Plan
ORD	Chicago O'Hare International Airport
PARR	Problem Analysis, Resolution, and Ranking
PBO	Performance Based Organization
pFAST	Passive Final Approach Spacing Tool
PHX	Phoenix International Airport
RNAV	Area Navigation
RVSM	Reduced Vertical Separation Minima
SF-21	Safe Flight 21
SFO	San Francisco International Airport
SOIA	Simultaneous Offset Instrument Approaches
STL	St. Louis International airport
SUA	Special Use Airspace
TMA	Traffic Management Advisor
TRACON	Terminal Radar Approach Control Facility
VMC	Visual Meteorological Conditions
VNAV	Vertical Navigation
WAAS	Wide Area Augmentation System
ZAU	Chicago ARTCC (Chicago, IL)
ZID	Indianapolis ARTCC (Indianapolis, IN)
ZMP	Minneapolis ARTCC (Minneapolis, MN)
ZOB	Cleveland ARTCC (Oberlin, OH)

Appendix

Timelines




En Route Congestion
Match Airspace Design to Demands
Initial Choke Point Sectors, En Route Smoothing & NRP Modifications
LDR Casebook Dissemination
Bay-to-Basin Redesign (California 03/04))
Final Choke Points Sectors, Kansas City ARTCC
High Altitude Concept Demo
Great Lakes Corridor (ZOB, ZMP, ZID, ZAU)
Collaborate to Manage Congestion
Operational Rules and Process Changes (Annual Cycle)
Train Personnel and Implement Recommendations (Annual Cycle)
Reduce Voice Communication
CPDLC Build I at MIA
PETAL 2 Trials
CPDLC Build IA
Reduce Vertical Separation
Accommodation of Non-approved Aircraft
Rulemaking Final
Plan for Phased Implementation
First Phase of Operational Use
Reduce Offshore Separation
Introduce RNAV routes to replace J58/86
Complete investment analysis to support selection of surveillance system option
Domestic Separation Below FL290 in Gulf of Mexico
Deploy 3rd VHF communication buoy to provide VHF controller-pilot communication down to flight level 180
Domestic Separation Above FL290 in Gulf of Mexico
Reduce Oceanic Separation
ICAO Regional Procedures and Guidance
Determine En-route Modification
Initial Operational Use of 30/30 Separation
Accommodate User Preferred Routing
Deploy URET at Seven FFP1 Sites
Deploy URET at Nine Additional Sites
Deploy URET at Four Additional Sites (Post 05)
Comprehensive Revisions to Restrictions (Ongoing)
Evaluate PARR/D2/EDA
Provide Access to Restricted Airspace
Agreement on Procedures/Practices
Upgrade to MAMS
2001
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2004
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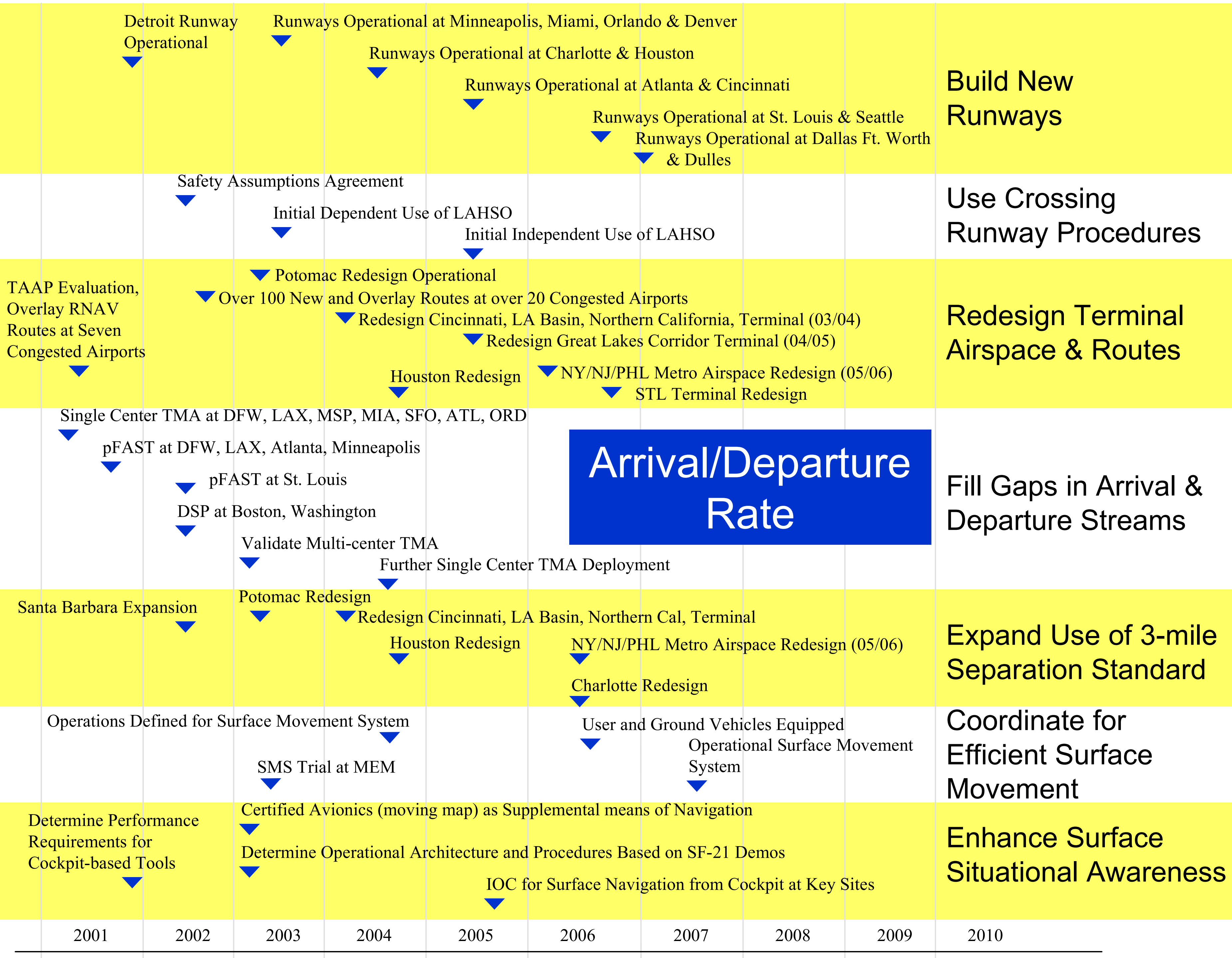
2009
2010


Detroit Runway Operational
Runways Operational at Minneapolis, Miami, Orlando & Denver
Runways Operational at Charlotte & Houston
Runways Operational at Atlanta & Cincinnati
Runways Operational at St. Louis & Seattle
Runways Operational at Dallas Ft. Worth & Dulles
Build New Runways
Safety Assumptions Agreement
Initial Dependent Use of LAHSO
Initial Independent Use of LAHSO
Use Crossing Runway Procedures
TAAP Evaluation, Overlay RNAV Routes at Seven Congested Airports
Potomac Redesign Operational
Over 100 New and Overlay Routes at over 20 Congested Airports
Redesign Cincinnati, LA Basin, Northern California, Terminal (03/04)
Redesign Great Lakes Corridor Terminal (04/05)
Houston Redesign
NY/NJ/PHL Metro Airspace Redesign (05/06)
STL Terminal Redesign
Redesign Terminal Airspace & Routes
Single Center TMA at DFW, LAX, MSP, MIA, SFO, ATL, ORD
pFAST at DFW, LAX, Atlanta, Minneapolis
pFAST at St. Louis
DSP at Boston, Washington
Validate Multi-center TMA
Further Single Center TMA Deployment
Arrival/Departure Rate
Fill Gaps in Arrival & Departure Streams
Santa Barbara Expansion
Potomac Redesign
Redesign Cincinnati, LA Basin, Northern Cal, Terminal
Houston Redesign
NY/NJ/PHL Metro Airspace Redesign (05/06)
Charlotte Redesign
Expand Use of 3-mile Separation Standard
Operations Defined for Surface Movement System
SMS Trial at MEM
User and Ground Vehicles Equipped
Operational Surface Movement System
Coordinate for Efficient Surface Movement
Determine Performance Requirements for Cockpit-based Tools
Certified Avionics (moving map) as Supplemental means of Navigation
Determine Operational Architecture and Procedures Based on SF-21 Demos
IOC for Surface Navigation from Cockpit at Key Sites
Enhance Surface Situational Awareness
2001
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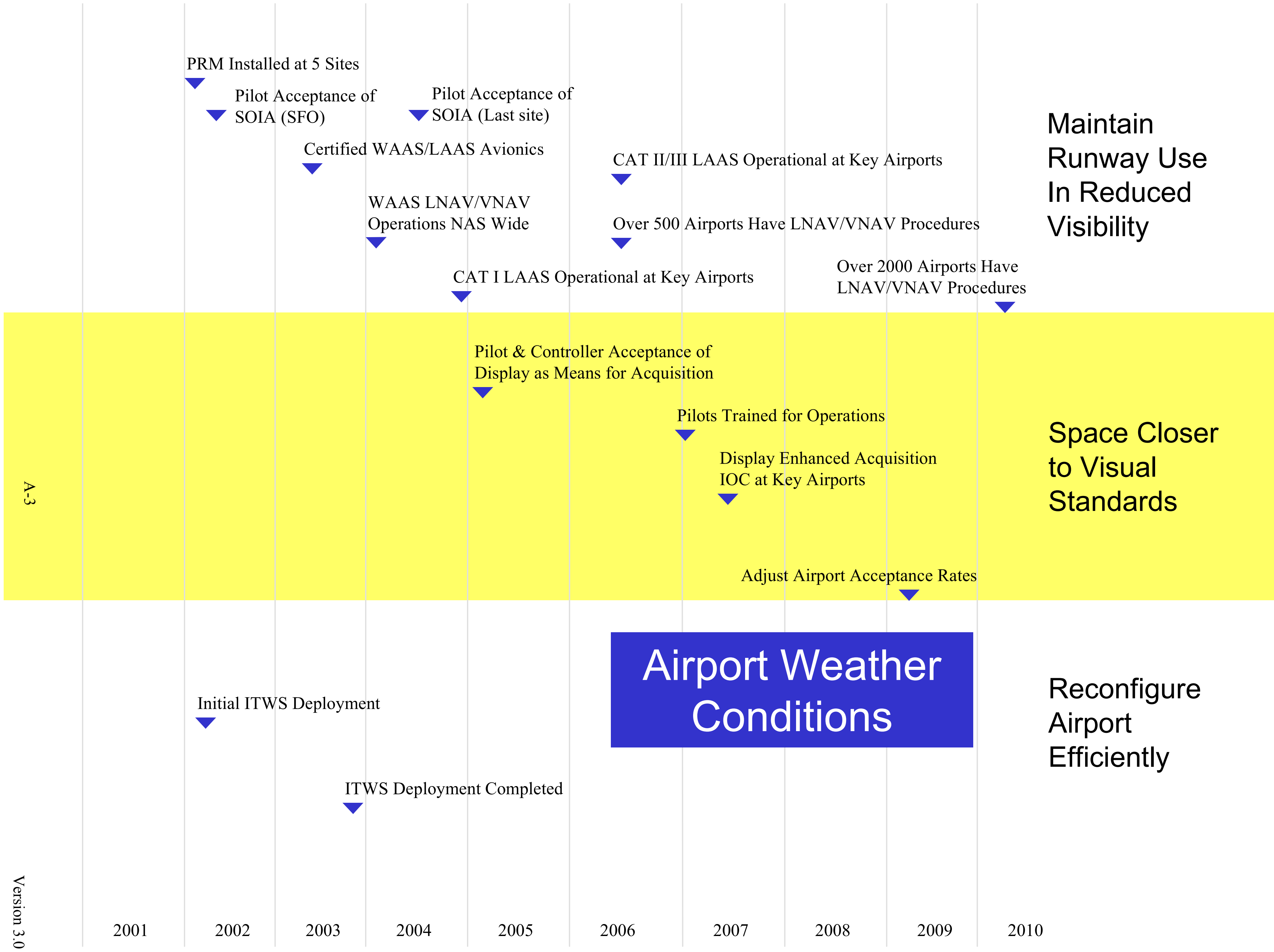
2008
2009
2010


PRM Installed at 5 Sites
Pilot Acceptance of SOIA (SFO)
Pilot Acceptance of SOIA (Last site)
Certified WAAS/LAAS Avionics
CAT II/III LAAS Operational at Key Airports
WAAS LNAV/VNAV Operations NAS Wide
Over 500 Airports Have LNAV/VNAV Procedures
CAT I LAAS Operational at Key Airports
Over 2000 Airports Have LNAV/VNAV Procedures
Maintain Runway Use In Reduced Visibility
Pilot & Controller Acceptance of Display as Means for Acquisition
Pilots Trained for Operations
Display Enhanced Acquisition IOC at Key Airports
Space Closer to Visual Standards
Adjust Airport Acceptance Rates
Airport Weather Conditions
Initial ITWS Deployment
ITWS Deployment Completed
Reconfigure Airport Efficiently
2001
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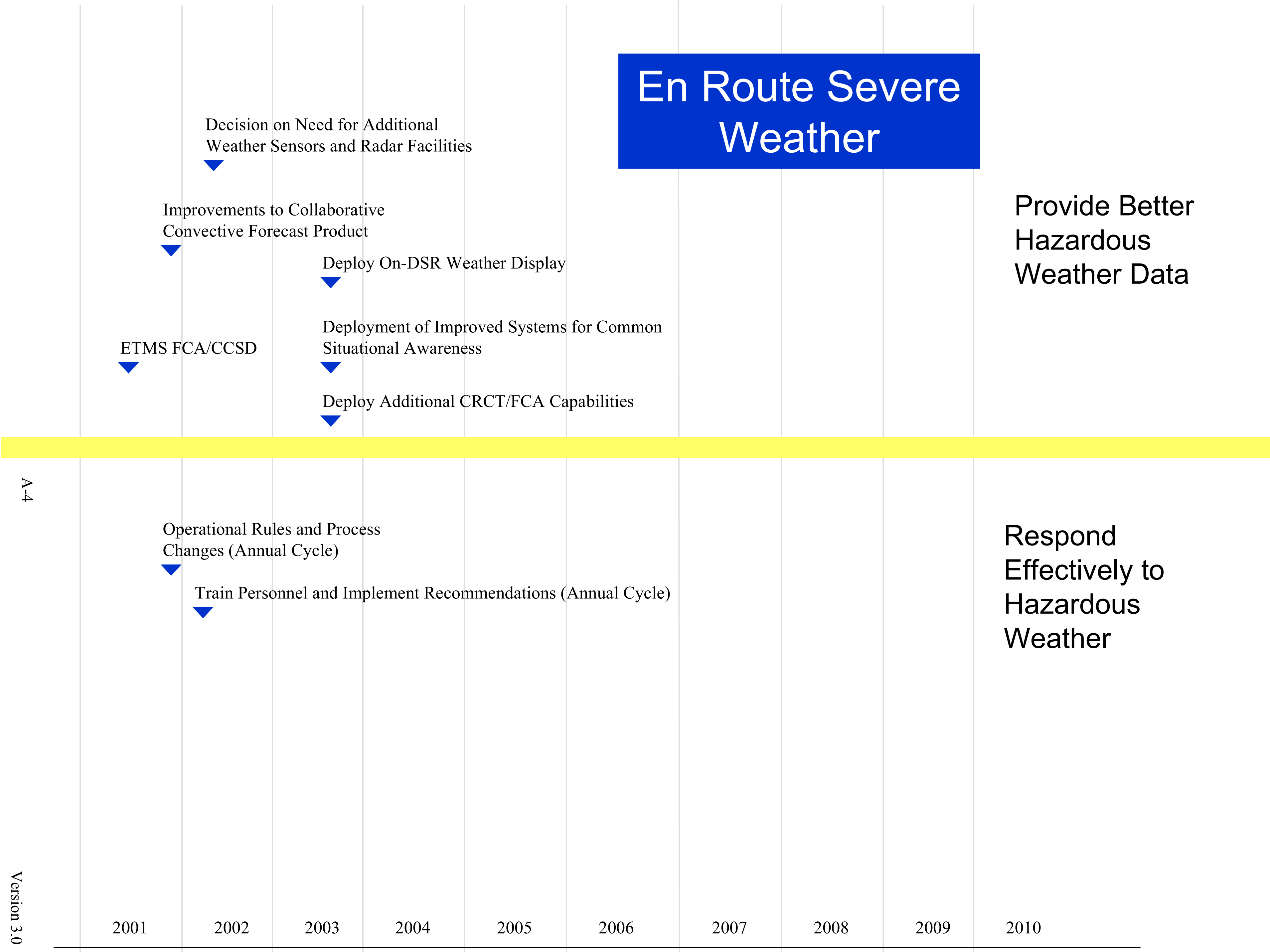
En Route Severe Weather
Decision on Need for Additional Weather Sensors and Radar Facilities
Improvements to Collaborative Convective Forecast Product
Deploy On-DSR Weather Display
ETMS FCA/CCSD
Deployment of Improved Systems for Common Situational Awareness
Deploy Additional CRCT/FCA Capabilities
Provide Better Hazardous Weather Data
Operational Rules and Process Changes (Annual Cycle)
Train Personnel and Implement Recommendations (Annual Cycle)
Respond Effectively to Hazardous Weather
2001
2002
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2010